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THE PROPER SCOPE OF SCIENTIFIC (SO-CALLED EXPERT) TESTIMONY IN TRIALS INVOLVING PHARMACOLOGIC QUESTIONS.[1]

By Solomon Solis Cohen, M.D., of Philadelphia,
Professor of Clinical Medicine in Jefferson Medical College.

It is by request of your committee of invitation that I shall devote the address I have the honor to make to you to-day to the consideration of the subject of "expert testimony" in certain of its relations having a common interest for physicians and pharmacists. My criticisms will be addressed principally to our own faults, not to those of others. Doubtless there are many motes in the eyes of the lawyers; but before we discuss the best method of extracting these motes, let us try to discover how we can get rid of the beams that tend to make our own vision oblique.

It is not to be denied that the "medical expert" or "chemical expert" witness is often an object of suspicion to courts and juries; that lawyers out of court find no impropriety in ridiculing him, while in court, if he is on the other side, their attitude toward him is not invariably one of the highest respect for his knowledge or his devotion to the truth. Moreover, this unflattering estimate of the sincerity of the expert witness is not confined to courts and lawyers; it is reflected in the press and in the comments of the man in the street. It would be soothing to wounded vanity to attribute the distrust of expert testimony entirely to the obscurity of the difficult scientific questions so often involved and the inadequacy of the legal methods of the day for the development and presentation of such

[1] An address delivered before the Philadelphia College of Pharmacy, November 15, 1904.

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questions. Undoubtedly these impersonal elements are important factors; but it must be admitted that there are also personal factors, and that for the latter, physicians and chemists are not without blame. When men of equal reputation and competence can be found, apparently in any desired number, to form either of two opposite opinions upon the same apparently simple set of facts; can be induced to express positive and conflicting views upon questions concerning which the evidence is insufficient for the formation of a positive view of any kind; and are willing, moreover, to suggest to an attorney questions that seem to have no other purpose than to confuse scientific colleagues who may appear as witnesses on the other side, or unfairly to impugn and belittle the evidence given by such colleagues—is the assumption wholly without plausibility that the nature of the testimony given by any expert witness is in effect determined by the necessities of that side of the case upon which he is employed? We know, and many attorneys know, that, despite its plausibility, the assumption is far from being correct. But that is because we and the attorneys know what the newspapers and the public do not know and cannot know; namely, how often physicians and chemists decline to testify in behalf of interests that have consulted them, because on examination of the facts they find that they cannot truthfully give the testimony desired. That incompetent, inaccurate, overzealous, or even untruthful persons sometimes appear in the rôle of expert witnesses, playing it very much to the satisfaction not only of their employers, but also of the jury and the spectators—may be admitted. With this phase of the subject, however, I do not purpose to deal at this time. I shall consider only the difficulties besetting competent men, desirous to tell the truth and nothing but the truth, when they go upon the witness stand to instruct courts and juries upon pharmacologic and toxicologic questions.

In the first place, it is often requisite to state technical facts in untechnical language. There is much difference between lack of technicality and simplicity. The simplest statement is always the best; but the untechnical statement is not always the simplest—frequently it is the most complex. Consider for a moment only the physical and chemical questions of osmosis, of atomic weight, of valency, of crystallization, of stereochemism, of ionization; or the pharmacologic questions of the effects of drugs upon metabolism or upon cell structure. How can such matters be expressed in other

than technical terms, and yet be expressed both clearly and adequately? The only way out of the difficulty is not to try to get out of it. Let us state our technical position for the record, as simply as possible; that is, in technical terms. We may then explain in untechnical language for the jury. One common result of the effort to avoid technical statements is a multiplication of words from which juries, even more intelligent than the average, can gather no clear idea. Another is an impossible simplification of a difficult problem, which is consequently, even though a correct conclusion be reached, open to just criticism—*a fortiori* to captious criticism. Just here comes to light one grave fault of medical and chemical experts. We are too prone to make and to suggest that very kind of captious criticism of the testimony of an opposing witness, not for the purpose of eliciting truth, but in order to score a point in the game. Such tactics may be perfectly proper on the part of an advocate, but not on the part of one who professes to be impartially devoted to science.

And this brings into view a second difficulty. Theoretically, the expert witness is an adviser of the court. He is called in, because of his supposedly superior knowledge, to help the judge and jury to understand the significance of certain facts testified to by himself or others, which cannot be understood without such assistance. He should have no interest in the bearing of these facts upon the verdict to be rendered. Was or was not arsenic present in a certain liver or stomach examined by him? Do or do not certain post-mortem appearances, or certain symptoms observed during life, indicate death from poisoning? Is or is not the continuous and unsuspected administration of unknown quantities of boric acid or salicylic acid or sodium sulphite injurious to health? These and like matters are the subjects upon which he is called to state judgments of fact or to express opinions, and in consequence to detail the observations and explain the reasoning upon which such judgments or opinions are based. But his interest in the matter should be entirely scientific. It should be no concern of his, as a witness, whether the presence or absence of arsenic in the tissues or other materials that he has examined, or the significance of the symptoms described, or the harmfulness or harmlessness of chemicals used as food preservatives, may lead to the conviction or acquittal of any individual or the gain or loss of any commercial interest. His function in court is quite clear. It is (*a*) to describe the methods and the results of his ex-

aminations; (*b*) to state the conclusions that his study and observation in general enable him to draw rom a given set of facts observed and described by him or testified to by others; (*c*) to enlighten the court as to matters of scientific knowledge relevant to the issues presented, but not dependent upon any testimony as to fact given in the special cause at trial. Beyond that his testimony, his advice, his interest, should not go.

Under present methods, however, the expert witness is not summoned in his theoretical capacity of impartial teacher and adviser. He is called apparently, and often in reality, as a partisan and an advocate. Indeed, whatever his own view may be as to his relation to the case, he is usually regarded and treated as a partisan and advocate by judge, jury, lawyers, spectators and newspapers. How often do we read in great headlines of the "Battle of the Experts!" How often is the speculation heard, privately or publicly, as to whether the prosecution or the defense will "get Dr. A.," with the implication that the other side will then necessarily "get Dr. B.," and that Drs. A. and B. will, of equal necessity, express in court opposite opinions on the same facts.

There is unquestionably a legitimate field of work for the scientific or "expert" advocate; but it is by the side of counsel, not on the witness stand. As witness, one is bound by his oath and by his duty to the court and to the State to endeavor to assist judge and jury to reach correct conclusions, without reference to the effect of those conclusions upon the verdict to be rendered. He is to distort nothing, magnify nothing, minimize nothing; assert as positive nothing doubtful, throw doubt upon nothing certain; introduce nothing irrelevant, suppress nothing material; give utterance to no statement of fact, advance no theory, that he would shrink from defending before a learned society. But as advocate, one may properly consider the bearing of testimony upon the verdict and endeavor to have judge and jury impressed with the especial importance of those facts and theories making for his side of the case, and with the doubtfulness and unimportance of those making for the opposing side. The functions of the witness and of the advocate should therefore never be united in the same person. Human nature being what it is, however, our present methods tend to imbue expert witnesses with somewhat of the advocate's spirit. Some do not realize this tendency; others, despite their effort to avoid

partisan advocacy, are badgered into it by the unfair efforts of cross-examiners to throw doubt and obscurity upon their direct testimony. Unfortunately these efforts are sometimes instigated and directed by the expert witnesses of the other side.

The remedy for this difficulty lies wholly in our own hands. It will not do to abuse the lawyers for it, however much they may abuse us when we are on the witness stand. Use, abuse or misuse what and whom they will, they cannot make use of us for any purpose for which we refuse to be made use of.

A third order of difficulties has been alluded to, but may now be considered more fully. It is often assumed that expert witnesses are not called to give testimony as to fact, but merely to express opinions, and that hence opinion may properly be set against opinion. This is but partially true. Expert witnesses are frequently called to express opinions upon facts which they must themselves first testify to, or to express judgments of fact, and not opinions at all—upon investigations that they have themselves made. This is especially the case with chemists and pathologists. We can here confine our attention to chemists.

A chemist or pharmacist may be asked, for example, to make certain analyses in order to determine the purity of pharmaceutical products, or to acertain whether foods or articles of commerce have been adulterated or have had foreign substances added to them to color, disguise, or preserve them; or to discover whether certain substances—sometimes human tissues—contain poison. He submits the suspected articles to certain physical and chemical manipulations; examines them with the naked eye, with the microscope, with the spectroscope, and otherwise. Upon the results of these examinations he forms a judgment. When describing in court the methods and results of his examinations, it will be generally admitted that he testifies as to facts. How about the judgment he has formed? That judgment, when stated in court, is commonly treated as an expression of opinion. In reality, it is a judgment as to fact, as valid as any other judgment as to fact that can be made the subject of testimony. It differs from ordinary judgments in that special skill and knowledge are required, first, to obtain its data, and, secondly, to understand their significance; but so do many other judgments that we never think of treating as matters of opinion—which are, indeed, recognized to be therefore more accurate—

not more dubious, than ordinary judgments; for example, that of a navigator as to the position of his ship, or of a surveyor as to the dimensions of a certain plot of ground, or of a skilled weigher as to the number of pounds contained in a heap of coal. The differences that may exist among these various judgments are not those of kind, but merely of degrees of complexity. Such judgments may be mistaken; but that, while it subjects them to correction, does not remove them to the category of opinions—unless the term opinion be extended to include every mental operation in the nature of a judgment.

Testimony concerning chemical analysis and its results is properly to be subjected to criticism as to the pertinency, correctness, skill, and accuracy of the manipulations and as to their conclusiveness; but such criticism deals with fact, and must be kept within due bounds. It is perfectly proper to point out, for example, that in the attempted identification of poisons, a careless observer may mistake antimony for arsenic; but it is misleading—and a competent chemist must consider it deliberately so—to attempt to make a jury believe that discrimination between arsenic and antimony is at all uncertain when the right tests have been made with due care and intelligence. It is not in any degree a matter of opinion subject to debate and dispute, but an acknowledged fact of science. No expert should lend himself to a pettifogging practice of the nature described.

Again, it is proper to point out and inquire about all sources of error in manipulation; but undue insistence upon widespread contamination of vessels and reagents with, for example, arsenic, can be considered only captious criticism in the presence of statements that due care has been taken by blank tests and otherwise to exclude that source of error and when amounts have been found not to be accounted for even approximately by these common contaminations. I have elsewhere suggested that important examinations by official analysts should be made in the presence of experts representing the other side; or that both sides should, in cases in which this method is possible, be permitted to have analyses made by their respective experts. The further suggestion was also made that analysts should be required to be preserve the results of final and decisive tests for exhibition and criticism in court. Such procedures would go far, I think, to avert the sort of criticism here deprecated and also to guard against incompetence, carelessness or error, in official or partisan analysis.

Opinions may, in certain cases of chemical analysis, differ as to the scope and conclusiveness of special tests. In all such cases it is a simple matter for the expert witnesses on both sides to state the issue, first in technical terms for the record, secondly in non-technical terms for the enlightenment of court and jury, and in such a way as to make clear the exact point in dispute and its bearing on the final judgment of fact. It is also easy to take the opposite course with intent to becloud the issue. Were the straightforward, scientific, impartial way obligatory in every instance, many issues which have been allowed to occupy much of the time and attention of courts and juries would at once be shown to be based on trivialities of no possible importance in the cause at trial.

Still another source of confusion between fact and opinion arises from the questioning of expert witnesses as to what may be termed facts of science, and the failure of courts to rule uniformly as to just what testimony of this kind is admissible. One court will permit the widest and wildest latitude; another will exclude as "hearsay" all matters outside the personal experience of the expert witness. I do not purpose to discuss these conflicting rulings from a legal viewpoint. Shall doctors decide when judges disagree? But I may be permitted to point out the logical and scientific difficulties involved in both positions.

First let us consider the position of an expert witness called upon to differentiate between the knowledge he has obtained from reading and that which he has acquired by personal observation. How far a chemist or pharmacist may be able to do this, I do not know. If you have all verified by balance-tests and other appropriate methods the atomic weights, the valencies, the electric positions, and other properties of all the elements, and the structures of all the compounds, perhaps you may begin to think of qualifying under the "no hearsay" rule. I doubt, however, whether any physician could state accurately how much of the composite pictures he carries in his mind of the symptomatology and pathology of diseases and of the effects of drugs—even of a disease so common as typhoid fever or of a drug so much used as opium or mercury—is based upon cases personally observed, to the exclusion of those read about. One of the best known pathologists in America, a man of enormous experience, told me that he had never personally made a post-mortem examination of a case of combined sclerosis of the

spinal cord, although of course he had seen and studied sections of cords from such cases. Some physicians have never seen a case of infantile scurvy; but they know that the affection exists and that it gives rise to discolorations of the skin that are often mistaken for bruises, and upon which unfounded charges of cruelty to children may be brought. I have never examined a thyroid gland for iodin or arsenic, yet I know that iodin is constantly and arsenic sometimes found in thyroid glands of men and animals, apparently in each case as a normal constituent. If the question of the possible presence of iodin or arsenic in normal thyroid glands should be of importance in a given trial, could I not properly state my knowledge as book knowledge? Must one send for Mendel or Gautier to testify to personal analysis? I have never seen an insane person commit homicide or suicide, yet I have testified in court that certain persons ought to be kept under restraint lest they should kill themselves or others, and I believe that the testimony was properly given and properly accepted. Would not the "no hearsay" rule exclude this testimony also? Even had I seen the dead bodies of insane suicides or of the victims of homicidal maniacs, that fact would not seem to remove my knowledge from the hearsay category; nothing would do that except actually seeing the killing. I know that arsenic poisoning has been caused by contaminated beer, by wall paper, by stockings; though I have never analyzed beer, wall paper or stockings for the presence of arsenic. I know that in this city fatal lead poisoning has been caused by cakes colored with chrome yellow, though I did not see any of the cakes. I have not even seen the men at work painting or making lead, whom I have treated for lead poisoning acquired in such occupations.

That iodin is a constant normal constituent of the thyroid gland, and that Gautier, Bertrand, and others have found arsenic in the normal thyroid gland and other normal tissues; that maniacs have committed homicide and suicide; that arsenic poisoning has been caused by contaminated beer—are facts, not opinions. They are facts known only or best to certain persons, because those persons have made special studies involving the knowledge of such facts; and whatever the law may be, it would appear reasonable that when facts of this order are relevant to the issue, qualified persons should be permitted to testify concerning them as part of the sum total of the knowledge acquired by reading and observation. On the other

hand, when a fact of this nature is uncommon it is perfectly proper to bring out its rarity; and, if such be the case, to show that while an integral portion of the witness's knowledge, it is, nevertheless outside of his personal observation.

So much for the one position. Now for the other. To confine ourselves to a chemical illustration, which may have toxicologic bearing, let us take Gautier's observation of the presence of arsenic in the normal human body. If this bare statement should be permitted to be made in court in a case in which the presence of arsenic in a given body is the basis of a murder trial, one can see that justice might easily be defeated. Were Gautier himself testifying, he would say, as he has written, that arsenic could be found in normal human bodies only by the use of a certain very delicate technique, which I need not here describe; that he had found it only in the ectodermic structures, and chiefly in the thyroid gland; that he had never found it in the normal liver or normal stomach or normal muscles. He would add, that even in the thyroid gland he had found it only in minute quantity—about $\frac{16}{100}$ of a milligramme in the average human thyroid; that is to say, in the proportion of about $\frac{1}{4000000000}$ of the average body weight; so that if by any inconceivable post-mortem diffusion the thyroid arsenic should escape into all the tissues, it would be in a proportion absolutely beyond detection—the least that he has been able to detect being $\frac{1}{2000000000}$, that is to say, $\frac{1}{200}$ of a milligramme in 100 grammes of tissue. To translate this into grains, it would take 100 thyroids—or, if diffused, 100 entire human bodies—to yield ¼ grain of normal arsenic to Gautier's test; or to follow Gautier's fair statement to the letter, even doubling the assumed quantity of normal arsenic in a cadaver to $\frac{32}{100}$ of a milligramme to allow for possible traces in the skin and its appendages, we should need a mass equal to fifty bodies to give us the ¼ grain. A simple arithmetic calculation therefore shows that this observation, whatever may be its physiologic importance, has little medico-legal bearing. But the partial expert witness—that is, one who is telling only part of the truth in order to serve one side of the case—might say that Gautier had found arsenic in the normal human body in recognizable quantity and omit to say anything further. Or he might be ignorant of the details of Gautier's studies, even were the attorney for the prosecution sufficiently well posted to inquire concerning

them on cross-examination; and the whole truth thus failing to be brought out, a false impression would be left on the minds of the jurymen. Again, the widespread distribution of arsenic in nature and art might be testified to by expert witnesses, truthfully in a sense, and yet partially, and therefore untruthfully in the large sense. By such testimony a jury might easily be misled as to the real significance of the facts. For this is all matter of fact, not of opinion, whether or not it be matter of personal observation. While, therefore, the mere circumstance that a witness has not personally observed the fact of science concerning which he is questioned should not bar his testimony, it does seem that courts should exercise considerable caution as to the admission of such testimony, and might rightfully insist, first, that its relevancy to the special cause at trial be established; secondly, that the witness should be required to affirm his familiarity with all the pertinent details of the special facts to be testified to, and, furthermore, be required to state them, even in the absence of cross-examination. Failure on the part of a witness to make such full statement should then be considered sufficient reason, if shown, to throw out all his testimony. This rule would at least tend to discourage witnesses from giving partial and misleading testimony.

Another order of testimony given by experts relates to matters purely of opinion. Here the position becomes more difficult both for court and witness.

A pharmacist testifying as a matter of chemical fact that he has found a certain quantity of arsenic or strychnin in a human body, may be asked whether it is sufficient to kill or indicates that there has been in the body at any time sufficient to kill? The least quantity of arsenic or any other poison necessary to kill a human being should be a matter of fact; it is, however, for many reasons, one of opinion. In the first place, the experiment has never been made under rigorous conditions. In the second place, in most, if not all of the recorded cases of poisoning, alike in those attended with recovery and those ending fatally, either the exact quantity taken is unknown, or it is so large that no estimate of a minimum lethal dose can be based upon it—while in cases of recovery from large doses there has often been evacuant, antidotal, or other treatment. In the third place the individual variations in responses to drugs of all kinds are great. Moreover, the hearsay element must be large in

such opinions. A pharmacist has knowledge of the doses ordinarily prescribed, and from his reading has some knowledge of the symptomatology of drug poisoning; but his observation has not been, like the physician's, of a character that such reading may be assimilated therewith; and there thus seems to be a valid objection to the admission of his answer. Similarly he may be questioned as to the harmfulness of adulterants or preservatives of food. Here again his observation is not of such a character that his answer can be anything more than opinion, and the line of his studies does not ordinarily lend authoritative weight to his opinion on such topics. But the physician occupies a different position in respect to these questions. They form an important part of his studies and are integrated with the whole mass of his knowledge. He is therefore entitled to express an opinion concerning them; and although he may never have poisoned any one with boric acid or salicylic acid, deliberately or accidentally, or may never have recognized impure benzoic acid as the cause of stomach and kidney disease in his patients, his opinion that such substances can and do injure the human stomach and kidneys, should be accepted in evidence. *Absence of knowledge* on these subjects, should not, moreover, be twisted by an expert witness into *knowledge of absence* of injurious effects.

Other cases, however, present difficulties to a physician asked to give an expert opinion. Thus, on matters of chemistry and pharmacy outside his experience, his opinions are ordinarily of very limited value. But let us also consider cases that may be within his experience.

A physician who has observed a patient during life and has not suspected poisoning, may, after the death of the patient, have his suspicion aroused, and in reflecting upon the symptoms he may see a new significance in them. This suspicion may be confirmed by the post-mortem examination and the chemical analysis. His honest opinion based upon all the facts may then be different from one previously expressed upon partial knowledge or even embodied in a death certificate. Yet, unfortunately, he is exposed to animadversion because of his change of view. Still more difficult is the question presented in a case of suspected poisoning to a physician who has not seen the living person or the corpse, but is asked to express an opinion, on facts described by others, as to the nature of symptoms during life, and as to the cause of death. Here the ques-

tion is one of pure opinion, for the facts are all beyond his knowledge. It is evident that in the absence of complete and careful observation the facts may be so manipulated as to give apparent basis for discrepant opinions. One set of circumstances is made prominent by witnesses for defence, another by witnesses for prosecution. Few, if any, scientifically accurate observations have been made of symptoms. The autopsy may have been defective in various ways. The testimony of witnesses not only on opposite sides, but on the same side may be contradictory or even in certain particulars self-destructive, from a scientific viewpoint. The physician may thus be inclined to minimize in his own mind certain testimony, which nevertheless he is called upon in his sworn opinion to give credence to. Evidently when he cannot form a positive opinion, it is his duty to say so, and not to attempt to twist dubious or insufficient evidence into the support of a partisan, because partial, view. Again, an expert is forbidden to formulate questions which he is to be called upon to answer, and yet some error in the formulation may apparently color his testimony otherwise than he desires. He must avoid this by so formulating his answer that it shall tell its own story independently of the question, and by limiting his answer so that it may be positive only so far as the facts are positive; and qualified as to uncertainty or probability when the facts so demand.

Many other difficulties affecting expert testimony on pharmacologic questions might be stated, but those discussed seem to be the main ones, and perhaps if they can be averted the others will to a large extent disappear.

In addition to the practice of controlled examinations and exhibition of results already alluded to, I have elsewhere suggested a method that would do away with our main difficulties, but this method is not likely to be adopted for many years, if at all. It is too simple and direct. That method is the submission of purely scientific questions to a commission of experts, who shall, in advance of the jury trial, hear the relevant testimony as to matters of fact, including the methods and results of any scientific examinations, but no mere opinions from witnesses—opinions being put forth by experts frankly appearing as advocates, and arguing upon the testimony submitted. Such a commission could submit to the court a report or reports, which could thus become part of the evidence heard by the jury that has to find the verdict, and before whom no expert should appear as witness.

In the absence of this simple and direct way out of present difficulties, is there any other? Yes—if we, physicians, chemists and pharmacists—choose to take it. When we are called upon to consider the facts in a given case in order to determine their significance, and what testimony we can give concerning them, we should make certain stipulations, and I may add that there is little difficulty in securing the assent of attorneys to reasonable conditions. An attorney who should refuse his assent would, I judge, be a first-class attorney *not* to be associated with. These stipulations are:

(1) That there is no obligation to testify or to give counsel involved in the acceptance of a fee to examine papers or otherwise look into the facts. This is, I believe, usually understood.

(2) That the nature of the testimony to be given, in case the preliminary examination permits an agreement to testify at all, is subject to modification by the subsequent disclosure of new facts at the trial or otherwise; and that the attorney must then decide for himself whether or not to call one as a witness.

(3) That one is to be asked only simple and direct questions permitting the framing of answers that will bring out the whole truth as one sees it, and not merely fragments of the truth.

(4) That one is not to be expected to be positive upon uncertain matters, or to throw doubt upon those that are not doubtful.

(5) That one is not to be asked questions to which correct answers must be highly technical, and which can therefore only obscure the issue. That, indeed, one is not to be asked such questions for the very purpose of obscuring the issue.

[*To be continued.*]

WILLIAM PROCTER, JR., THE FATHER OF AMERICAN PHARMACY.[1]

By John F. Hancock, Baltimore.

I esteem it a privilege to be welcomed by the members of this time-honored institution.

In being your guest this evening my mind reverts to the days

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[1] An address delivered at the Philadelphia College of Pharmacy, on Tuesday evening, December 13, 1904.

that have long since passed, and memory recalls many pleasant associations with the members of your College.

Mentally, I can see the men who made the Philadelphia College of Pharmacy illustrious in the past, and this evening I am pleased to meet with those who have diligently striven to maintain and perpetuate the good character and usefulness of this noble educational work.

For many years your College stood alone, on this vast continent, in providing the means of a systematic course of instruction to those who had elected pharmacy as their life work. Early in the past century your city became the centre of medical and pharmaceutical learning, and there were more celebrities in the two professions—medicine and pharmacy—found here than in any part of the United States. I believe the two professions were more intimately associated in Philadelphia than in any other city of the Union. Educational interests brought them close together in a common cause. This condition of things produced a mutual health and strength, highly beneficial to each, and equally so to the patrons of the two professions.

When I entered the ranks of pharmacy in 1854, exchanging the farm life for that of the city, I soon made the acquaintance of a graduate of your College, who had served an apprenticeship with the late Caleb H. Needles. He came as a clerk to the pharmacy where I was engaged, and I found him a useful companion. In less than two years after entering the business, I became part owner of the pharmacy—the firm being Landis & Hancock, and the clerk referred to remained in our employ, becoming my pharmaceutical instructor. This gentleman made me acquainted with the Philadelphia College of Pharmacy.

The books that engaged my attention at this time were the United States Dispensatory, by Wood and Bache, and Mohr, Redwood and Procter's Practical Pharmacy, edited by William Procter, Jr. Later on I learned to know more of the value of these books and their distinguished authors.

The Maryland College of Pharmacy was reorganized in 1856, and at great inconvenience to myself I matriculated as a student in 1857, and attended the lectures on Chemistry. I was graduated in 1860, joined the College, as a member, one year after, and in 1863 joined the American Pharmaceutical Association.

At this meeting of the Association I made the acquaintance of a distinguished pharmacist of your city, whom I was proud to meet, because I had heard so much of him. My surprise was to find him so approachable and pleasant, for I had thought that his high position would remove him from one so humble as myself. I met him frequently after that meeting, and always found him uniform in his demeanor. Towering above most other men in ability and position, he was kind to the most humble, but always maintained a mild and sympathetic dignity. He was not harsh in criticism, and his mildness of manner would give encouragement to those who were timid. He is not visible with us this evening, but he lives in affectionate memory of those who knew him personally.

I come to you this evening to pay my loving tribute to his memory. It would be useless for me to attempt to eulogize his valued life before an audience in this College. These halls are sacred to his memory. I come to plead with you for a public and lasting recognition of his services in the past, that his example may serve as a beacon, to encourage and stimulate the minds of those who would ennoble the duties of the pharmacist, in the present and future. Let us perpetuate the memory of one who has done so much for humanity by elevating his chosen calling to the dignity of a profession, in having qualified himself for its practice and rejecting the grosser garb of commercial pharmacy.

You have had in your College, since its organization in 1821, many examples of noble worth in its membership, and in those who, having graduated, have done missionary work in distant places. Their names are too numerous to mention, but you have had only one William Procter, Jr., and I venture to state that no one here will suggest his superior, past or present, in the ranks of pharmacy on the American Continent. As apprentice, college student, alumnus, professor, editor, author, he distinguished himself in each position, and never accepted any duty that he was not qualified to fill with credit to himself. His collateral studies and investigations had the object of magnifying the importance of pharmacy. He was constant and unabating in his efforts from the beginning to the end of his pharmaceutical career, and none knew it better than those I now address. Others may have shown superior ability in some directions, but his was a substantially rounded life, useful to others and an honor to himself.

Should such a life be passed into forgetfulness, and can it be regarded as ostentatious, to preserve such a memory in a substantial and public way? Is there any one present who would not mark the resting-place of a departed loved one with a stone, however humble, in commemoration of the lost friend or relative? If, by common consent, we accept the late William Procter, Jr., as the Father of American Pharmacy, should we not, as his children by adoption, commemorate the fact, and call the attention of future generations of pharmacists, druggists and chemists to his spotless reputation? I claim that it would not only be an honor to his memory, but also to those who recognize his worth and to American Pharmacy.

It would be useless at this time to recite the ancestry of this good man or to relate in detail what he did for pharmacy and pharmacists. The pages of THE AMERICAN JOURNAL OF PHARMACY and the proceedings of the American Pharmaceutical Association will fully gratify any one who wishes detailed information on the subject.

I am proud that he was a son of Baltimore, and equally so to know that he achieved his noble character and reputation in the city of Philadelphia. The tribute that I think should be paid to his memory is not for local fame. Living as he did, at about what was then the centre of population in the United States, there were drawn to him the youthful minds, from all directions and long distances, those who were prepared by him and his colleagues in the College for the higher duties of pharmacy. On returning to their respective homes these graduates of your College have been important factors to their Alma Mater.

The radiations from the centre were, in the many cases under my observation, impregnated with the noble principles of Procter, that made them more useful in the practice of pharmacy than they might have been under less favorable circumstances. Unfortunately, the teacher does not always reflect seriously his moral forces on the mind of the pupil.

We can not regard the late Professor Procter as a brilliant or smart man in the sense in which these terms are generally applied. The terms able, strong, reliable would have been more applicable in his case. He was a great and just man, and, beyond all, a gentleman.

Let us briefly survey what he achieved and the difficulties he must have encountered. At the age of three years death robbed

him of the support of his father. His mother was left with a large family of children and limited means, which deprived him of the advantages of a liberal education. One of his schoolmates related that "the boy William was studious, gentle and companionable, and greatly beloved by his teacher and classmates." William was taken from school at an early age to look after business interests for his mother. At the age of fourteen years he went to Philadelphia to visit a friend of his mother; at this time he made the acquaintance of the late Joseph C. Turnpenny, who was an apprentice with Henry M. Zollickoffer, at the corner of Sixth and Pine Streets. Young William Procter, Jr., became very much interested in the adopted business of his young friend, and without delay offered himself to Mr. Zollickoffer as an apprentice, which offer was accepted. The two lads were mutually interested in the study of pharmacy, Turnpenny graduating in 1833 and Procter in 1837. The two worked together as members of your College, until separated by the death of Procter.

From the beginning of William Procter's experience in pharmacy, he was a sober, painstaking, industrious student, verifying by experiments what he had learned from the study of books. His searching inquiry, integrity of purpose and unostentatious display of what he had learned, together with the love of imparting knowledge, ripened into a rich harvest of useful information that made him an authority in whatever he attempted to teach. We should not only feel a keen appreciation of his moral and intellectual worth, but seek to demonstrate it in a way to make his example most impressive on the lives of others. His disciples should not be the only ones to honor his memory and profit by his example, but physicians as well, and those who patronize them should be made acquainted with his noble character, that they may properly respect and estimate what the life and works of Procter have meant to pharmacy. For the standard which he upheld for so many years and labored to make possible for others, and in which he assisted his colleagues to establish in the practice of pharmacy, should receive the highest commendation of all classes.

The pharmacist occupies a peculiar position in the community, in being both a professional and a trades man. Professional ethics and commercial interests are often inharmonious. Unlike the professions generally, the ethical pharmacist is subservient to the physi-

cian, who naturally precedes him in attendance on the sick. The physician deals with the head of the home, and the pharmacist, in many cases, with servants and children. In the social life the physician holds the higher position and his duties are not so much of a drudgery.

The pharmacist has too many interests to serve, and it becomes very difficult for him to keep evenly poised. Should he lean to the commercial side and cater to the whims and wishes of public patronage, he is likely to offend physicians. Should he assume the ethical conduct of the professional side of pharmacy the public may lose interest in him. To be a money maker, commercial tact is necessary. To be an ideal pharmacist, one must adopt the Golden Rule for his guide and conduct. To support the dignity of his profession may result in appeasing his conscience rather than filling his purse. Should he be a commercial artist he is more likely to become popular with the masses, if he can succeed in posing as an ethical pharmacist while practising the schemes of the quack.

Professor Procter seems to have harmonized the various conflicting interests without sacrificing his self-respect. At least, while he was teacher, editor and essayist, his pharmacy did not suffer, as has been the case with some who have diverted their attention from the main issue. In all his varied interests none were seriously neglected, and he was confided in and respected in them all. He demonstrated the fact that one with scientific and practical qualifications, supported by industry, economy, good judgment and conservative integrity, can succeed in the practice of pharmacy, and should he not bequeath to his family a large financial fortune, he may leave a good name and a good example, which, after all, is the richest inheritance of humanity. Not by leaps did he ascend to the summit, but by systematic and persistent climbing. On reaching the goal, he remains the central figure in the pharmaceutical group.

The late Professor Huxley remarked on one occasion "that a good teacher is not usually a fluent speaker." This would apply to our late friend, yet he was an interesting speaker, and those who knew him well had implicit confidence in his statements. In debate he was respectful and convincing; as a writer he was clear and logical; as an investigator, painstaking and thorough; as a chemist and pharmacist, thoroughly reliable; in judgment, broad and liberal; and, as a companion, cordial and sincere. In the constancy

of his work, his ability, responsibility and the results of his many years of uninterrupted labor in the promotion of pharmacy, he was the acknowledged superior of all American pharmacists, and enjoyed both a national and international reputation for his achievements.

I claim, therefore, that his memory is worthy of our highest consideration, and that a monument to Prof. William Procter, Jr., the father of American pharmacy, should be erected at the national capital, and that a portion of the Smithsonian grounds should be requested as the most suitable site.

At the annual meeting of the Maryland Pharmaceutical Association in 1903, the following resolution was adopted:

Resolved, That the Maryland Pharmaceutical Association favors the erection of a bronze statue of William Procter, Jr., the father of American pharmacy, in the Smithsonian grounds at Washington, D. C., as the most fitting testimonial of that illustrious pharmacist, under such rules and regulations as may be necessary.

A committee on the Procter monument, of the same association, made a report, and a similar resolution was unanimously passed at its meeting this year. Maryland is on record favoring the monument. At the meeting of the American Pharmaceutical Association in Kansas City this year, I had the honor to read a paper favoring this movement.

And at the last general session I offered the following, which was adopted without a dissenting voice:

WHEREAS, The American Pharmaceutical Association from its inception has enrolled as members the most reputable and accomplished pharmacists and druggists of America, who, by the character of their annual contributions, have made it an ideal organization; and

WHEREAS, One of its founders, the late Prof. William Procter, Jr., became its most distinguished and honored member, through his untiring energy, ability and valued services to the close of his life; therefore be it

Resolved, That a committee of five be appointed by the president, said committee to be known as the Committee on the William Procter, Jr., Monument Fund, whose business it shall be to solicit subscriptions for a memorial monument.

Resolved, That when a sufficient amount shall be collected by subscriptions, this Association shall authorize and have erected in

the Smithsonian grounds at Washington, D. C., a bronze monument commemorative of the late William Procter, Jr., the father of American pharmacy.

Resolved, That the committee be authorized to invite the cooperation of the various State pharmaceutical associations, and all other bodies and individuals in sympathy with the undertaking, and that due credit be given to each subscriber.

Resolved, That the American Pharmaceutical Association shall be the custodian of all funds collected, and shall disburse the same for the object herein named, under such rules and regulations as may be adopted.

The committee provided for by the resolution has been appointed by President Beal, as follows: Henry Kraemer, of Philadelphia; Frank C. Henry, of Washington, D. C.; Benjamin T. Fairchild, of New York; C. S. N. Hallberg, of Chicago; John F. Hancock, of Baltimore. The committee will soon be organized for work, and they will have to formulate a plan of procedure. We need all the light and assistance we can possibly get, believing that by united action the money necessary can be collected through the American Pharmaceutical Association, the State pharmaceutical associations and any other bodies and individuals interested in the laudable work.

THE ANATOMY OF EDIBLE BERRIES.

By A. L. Winton.

(*Concluded from p. 545.*)

THE AMERICAN GOOSEBERRY (*Ribes oxyacanthoides* L.).

American cultivated gooseberries are largely derived from the native species *R. oxyacanthoides* L. The Downing, the variety studied by the writer, is believed by Bailey[1] to be a descendant of this species.

Macroscopic Structure.—The gooseberry has much the same general structure as the currant, but the fruit is larger (1 to 2 centimeters in diameter), the calyx and style are longer (6 millimeters in length), and are pubescent, and the smooth pericarp is thicker (*Fig. 22*). The gelatinous coat of the seed is thicker (often 2 millimeters thick

[1] *Loc. cit.*, p. 393.

on the raphe side), but the seed freed from this coat is about the same size as in the currant, although somewhat narrower and more nearly terete. Unlike the European gooseberry, the surface is free from prickles.

Histology.—Pericarp.—(1) The Epicarp and (2) Hypoderm are practically the same as in the red currant.

(3) Mesocarp.—This layer is composed of extraordinarily large cells (often 0·5 millimeter in diameter), which are evident to the naked eye and are separated from each other by a network of cells hardly 0·05 millimeter in diameter. In the inner layers the small cells are less numerous or entirely lacking. Crystal clusters are abundant, particularly in the inner layers.

(4) Endocarp.—The most striking histological distinction between the currant and the gooseberry is in the structure of the endocarp,

FIG. 22.—American Gooseberry (*Ribes oxyacanthoides*). I Whole fruit, × 1. II Transverse section of fruit with seeds, × 1. III Seeds deprived of gelatinous coat, × 8.

which in the currant is a dense sclerenchymatous tissue, in the gooseberry a layer of parenchyma cells with walls so thin that they are studied with difficulty. This remarkable difference in structure of two fruits of the same genus led the writer to examine the fruit of *R. aureum*, the only other species of this genus available for study. In this fruit, which resembles more the black currant than the gooseberry, the endocarp cells, although apparently parenchymatous, had thicker walls than those of the latter, and the cells were arranged in a manner similar to those of the sclerenchymatized endocarp of the currant. A study of this coat in other species, and in all stages of development, would doubtless disclose other intermediate forms.

Testa, Endosperm, and *Embryo.*—The microscopic structure of the seed is practically the same as that of the currant seed.

Floral Parts (*Fig. 23*).—The remains of the floral parts are usually deep brown, and can be studied to advantage only after bleaching, preferably with sodium hypochlorite, and staining. A prominent mid-vein runs from the base almost to the summit of each of the calyx and corolla lobes. About four secondary veins branching near the base, partly from the calyx midrib, partly from the corolla midrib, also run through nearly the length of the calyx lobes. Lateral branches from the midrib are numerous in the corolla, less so in the calyx.

The epidermal cells of the calyx are for the most part slightly elongated, and are arranged end to end in longitudinal rows. Near the ends of the lobes they have wavy outlines. The outer surface of the calyx and the upper part of the inner surface bear only a few

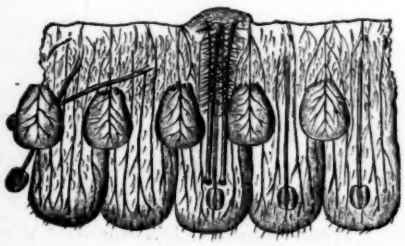

FIG. 23.—Gooseberry. Floral parts. × 5.

FIG. 24.—Gooseberry. Epidermis from margin of calyx, with hairs. × 160.

scattering hairs. The calyx throat, however, is densely pubescent. These hairs are all thin-walled, and vary in length up to 1 millimeter or more, the longest being in the calyx throat (*Figs. 24* and *25*).

The deeply parted styles are covered with epidermal cells, for the most part quadrilateral, and arranged end to end in rows, and on the lower half bear numerous thin-walled hairs 1 millimeter or more in length.

Microscopic Examination of Gooseberry Preserves.—The epidermis, mesocarp and seed have the same structure as the corresponding parts of the currant, but the endocarp is not sclerenchymatized as in the latter fruit and is not evident in preserves. The floral parts are of about the same length as in the black currant (6 millimeters)

but the calyx throat and the styles bear numerous long hairs, whereas these parts in the black currant are smooth, or only sparingly pubescent.

THE EUROPEAN GOOSEBERRY (*Ribes Grossularia* L.).

The European or prickly gooseberry, owing to the mildew to which it is subject, is not so successfully grown in America as the smooth-berried varieties derived from native species. Some of our

FIG. 25.—Gooseberry. Epidermis from throat of calyx, with hair. × 160.

FIG. 26.—European Gooseberry (*R. Grossularia*). Prickles with and without globular head. × 32.

popular varieties, however, have a few prickles on the fruit, and have doubtless European ancestors.

Garcin[1] describes the microscopic structure of the pericarp of *R. Uva-Crispa* (*R. Grossularia*). Blyth[2] devotes but a single sentence to the gooseberry, evidently the common European species.

A study was made by the writer of the berries of "Carmen," a prickly variety grown in the Station garden; and also of an unknown variety, unquestionably *R. Grossularia*, grown in Scotland.

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[1] Recherches sur l'histogénèse des péricarpes charnus. Ann. sc. nat. Botanique, 7e series, 1890, **12**, p. 175.

[2] *Loc. cit.*, p. 162.

Except for the prickles, the structure of both is the same as of the fruit of *R. oxyacanthoides.*

The Prickles have a broad base and are often over 1 millimeter long. Some have a blunt point, others a head of globular form. Both forms are shown in *Fig. 26.*

The Epidermal Cells of the prickles are elongated, and are arranged end to end in longitudinal rows. At the base they pass into the isodiametric cells of the epicarp.

THE CRANBERRY.

Bailey writes of this fruit as follows:[1]

"The cranberry (*Vaccinium macrocarpon* Ait.), the most unique of American horticultural products, was first cultivated, or rescued

FIG. 27.—Cultivated cranberry (*Vaccinium macrocarpum*). I Berry seen from above, × 1. II Transverse section of berry, × 1. III Seed, × 8. IV Transverse section of seed, × 15. S, epidermis of testa; S′, inner testa; R, raphe; E, endosperm; Em, embryo.

from mere wild bogs, about 1810. Its cultivation began to attract attention about 1840, although the difficulties connected with the growing of the new crop did not begin to clear away until about 1850. Cape Cod was the first cranberry-growing region, which was soon followed by New Jersey, and later by Wisconsin and other regions. The varieties now known are over a hundred, all having been picked up in bogs, and the annual product from tame bogs in the United States is more than 800,000 bushels. . . .

"This cultivated cranberry is *Vaccinium macrocarpon* Ait. There are other edible species, but they are not cultivated. The cowberry, or mountain cranberry, *Vaccinium Vitis-Idaea* L., is gathered in great quantities in Canada, where it is used for sauces. It is also native to Europe, where it is also much prized as a culinary fruit."

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[1] *Loc. cit.*, pp. 414, 424.

Macroscopic Structure.—Different varieties of the cultivated cranberry vary in shape (spherical, oval, pear-shaped), in color (pink, red, maroon, mottled), and in size (diameter up to 15 millimeters).

The epicarp is smooth, and bears on the summit four short tooth-like calyx lobes, which are usually bent inward. Between the calyx lobes is a circular spot with a dot in the centre, formed by the dropping of the floral parts.

FIG. 28.—Cranberry. Epicarp and hypoderm. × 160.

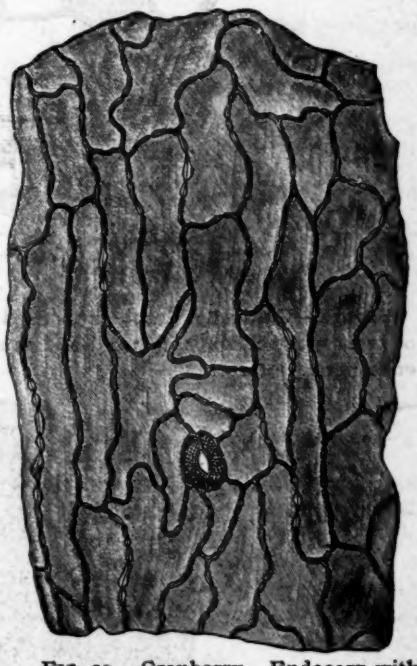

FIG. 29.—Cranberry. Endocarp with stoma. × 160.

The berry is four-celled, each cell containing on a central placenta a number of seeds which fill only a small part of the otherwise empty cavity (*Fig. 27*).

In the nearly ripe fruit only the epicarp is colored, the other parts being white; but in the fully ripe fruit all the tissues are usually red.

The yellow short-beaked seeds have a thick testa and a bulky endosperm, with an elongated embryo of moderate size, consisting chiefly of the radicle, in the axis.

The mountain cranberry has practically the same macroscopic structure as the cultivated species, but is much smaller.

Histology.—The following description applies to both the culti-

vated and the mountain cranberry, the two being nearly, if not quite, identical in microscopic structure.

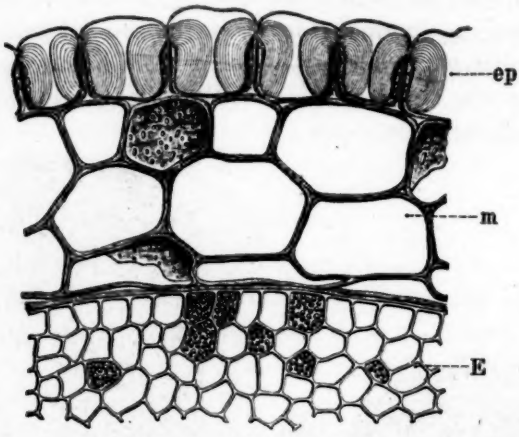

FIG. 30.—Cultivated Cranberry. Seed in transverse section. ep, epidermis of testa with sclerenchymatized and mucilaginous layers; m, inner testa; E, endosperm. × 160.

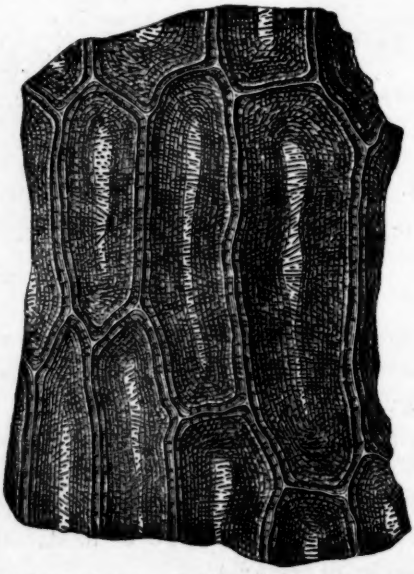

FIG. 31.—Cultivated Cranberry. Epidermis of testa in surface view. × 160.

Pericarp.—(1) The Epicarp (*Fig. 28*) is very simple in structure, with cells as seen in surface view from 0·02 to 0·05 millimeter in

diameter, and cell walls about 0·003 millimeter thick. Cross-sections show that this layer is about 0·025 millimeter thick and that the cuticle is strongly thickened.

(2) The Hypoderm (*Fig. 28*) is for the most part only one cell-layer thick, and the cells are more or less isodiametric in cross-section. Evaporation is largely prevented by the thick cuticle, rendering a more strongly developed hypoderm unnecessary.

(3) The Mesocarp cells are mostly isodiametric, and range up to 0·20 millimeter in diameter, but in the partitions of the fruit cavities they are somewhat smaller.

(4) The Endocarp (*Fig. 29*) is from 0·02 to 0·05 millimeter thick and is made up of a single layer of cells. As is seen in surface preparations, the cells are for the most part longitudinally extended and are more or less curved or wavy in outline. The indistinctly porous cell walls are somewhat thicker than those of the mesocarp, but unlike those in some *Vaccinium* species are not conspicuously

FIG. 32.—Mountain Cranberry (*Vaccinium Vitis-Idaea*). Transverse section of testa. × 160.

sclerenchymatized. Although stomata are entirely lacking in the epicarp, it is a remarkable fact that they occur in considerable numbers in the endocarp.

Testa.—(1) Epidermis (*Fig. 30*, ep, *Fig. 31*).—Of all the tissues of the cranberry, this layer is the most characteristic and remarkable. The cells in the mature seed range in width up to 0·1 millimeter and in length up to 0·4 millimeter, but in abortive seeds are much smaller. As is seen in cross section, the outer walls (*Fig. 30*, ep) are thin and convex, but the deep yellow or brown inner and radial walls are sclerenchymatously thickened (double radial walls often 0·02 millimeter thick), and in addition the radial walls and sometimes the outer and inner walls have a transparent mucilaginous layer of distinctly stratified structure which nearly fills the cell cavity. Treated with zinc-chloride-iodine the mucilaginous formation is stained blue, the cell walls proper remaining yellow. In *V. Vitis-Idaea* the outer and inner walls often have a swollen

layer, but this may also occur in *V. macrocarpon* and may not be characteristic of the former species (*Fig. 32*). The sclerenchymatous radial and inner walls are pierced with numerous pores which, in the immature or abortive seeds, are nearly circular, but in the fully ripe seeds are usually much elongated.

(2) Inner Testa.—The remainder of the testa consists of two or three layers of large thick-walled porous cells, the innermost layers being more or less collapsed. In dried or cooked specimens, all of these cells are collapsed (*Fig. 30*, m).

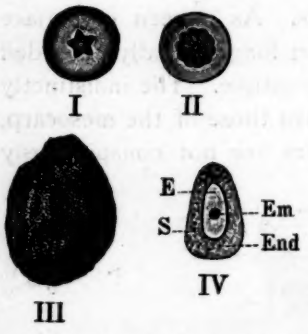

FIG. 33.—Huckleberry (*Gaylussacia resinosa*). I Fruit seen from above, × 1. II Transverse section of fruit, × 1. III Stone, × 8. IV Transverse section of stone, × 8. End, endocarp; S, testa; E, endosperm; em, embryo.

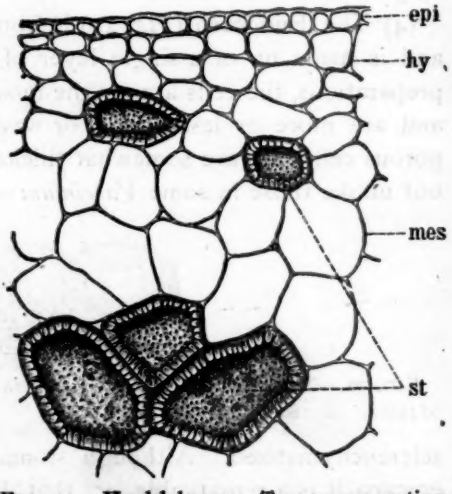

FIG. 34.—Huckleberry. Transverse section of outer portion of the pericarp. epi, epicarp; hy, hypoderm; mes, mesocarp; st, stone cells. × 160.

Endosperm (*Fig. 30*, E).—The average diameter of the cells is 0·035 millimeter. Protein grains are present throughout; starch is entirely absent.

The Embryo is not interesting in its microscopic structure.

Microscopic Examination of Cranberry Preserves.—Fragments of the epicarp and endocarp (the latter with stomata), bundles from the mesocarp, and seeds, may be found in preserves. The large porous epidermal cells of the testa with sclerenchymatous and mucilaginous layers are especially characteristic and may be studied in surface preparations. In unripe or abortive seeds these cells are smaller, thinner-walled, and have pores more nearly round than in the mature

seeds. Isolated stone cells detached by cooking from the testa of immature seeds, sometimes occur in the gelatinous portion of the preserve.

THE HUCKLEBERRY (*Gaylussacia resinosa* Torr. and Gray).

This berry is abundant in the northern United States, and furnishes large quantities of fruit for the market. So far as the writer can learn, it is not cultivated; but some of the blueberries (*Vaccinium*), which are closely allied botanically and are similar in appearance and flavor, are now being improved by Munson[1] at the Maine Agricultural Experiment Station.

Macroscopic Structure.—The huckleberry is globular in form, blue-black in color, and 1 centimeter or less in diameter (*Fig. 33*, I and II).

It is not a true berry, but a ten-celled drupe, the hard coverings of the so-called seeds being the inner walls of the pericarp cells.

The epicarp is smooth and the fruit is crowned with five pointed calyx lobes much like those of the cranberry. In the centre, between these lobes, is a small depression, the scar of the style.

The pits are closely crowded about the axis and as a consequence are wedge-shaped (*Fig. 33*, III and IV). Under the hand lens they have a rough granular appearance.

Within the thick endocarp is the seed with a thin testa and a bulky endosperm; in the axis of the endosperm is an elongated embryo.

Histology.—Pericarp.—(1) Epidermis (*Fig. 35*, epi).—Surface mounts show the cells of this layer to be much the same in form and size as those of the cranberry epicarp; cross-sections, however, show that the cuticle is much thinner.

(2) The Hypodermal Coat (*Fig. 34*, hy) is several cell-layers thick, and thus furnishes a protection against evaporation, which is not necessary in the case of the cranberry owing to its thick cuticle.

(3) Mesocarp (*Fig. 34*, mes).—Owing to the presence of numerous stone cells (st) this layer is strikingly different from the mesocarp of the other small fruits investigated, but resembles that of the quince and pear, although the stone cells are thinner walled and the parenchyma cells about them are not strongly elongated, and are

[1] Maine Ag. Ex. Sta. Rep. 1898, 164–172. Bul. 76, August, 1901. Am. Gard. **20**, 1899, 852.

not arranged in a marked radiating pattern. These stone cells are angular or elliptical and vary in diameter up to 0·2 millimeter. The walls (0·02 millimeter or less thick) are pierced with numerous small pores. They occur either singly or in groups throughout the mesocarp, and may be readily separated from the soft tissues by pressure.

(4) Endocarp (*Fig. 35*, end).—Most of the elements of this hard coat are stone cells, about the same size and shape as those of the

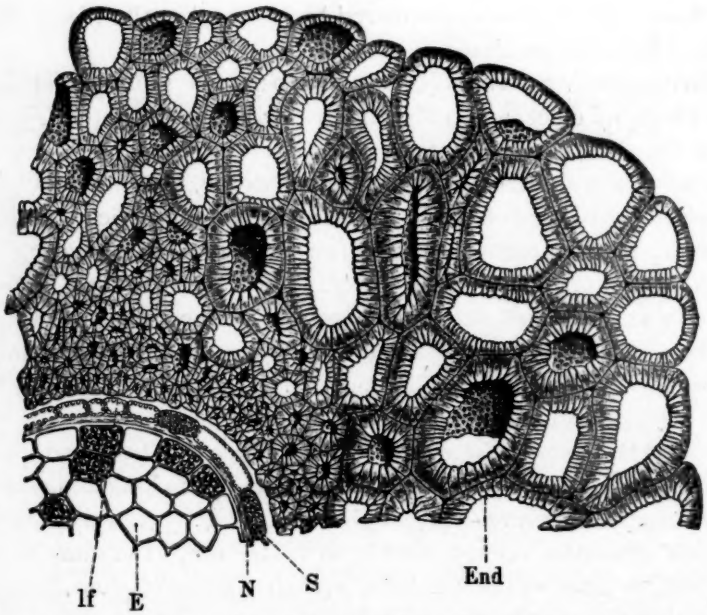

FIG. 35.—Huckleberry. Transverse section of endocarp and seed. end, endocarp with large isodiametric stone cells and lf, narrow longitudinally extended fibers; S, testa; N, hyaline layer (nucellus); E, endosperm. × 160.

mesocarp (although usually thicker-walled), but in the wall adjoining the mesocarp there is a group of narrow sclerenchymatous fibers running parallel with the axis of the fruit and similar fibers form the inner layer of the coat.

The pits of the huckleberry crush more readily between the teeth than those of the bramble fruits, owing to the larger size of the stone cells and the relatively larger cell cavities.

Testa (*Fig. 35*, S).—There is but one layer of cells in this coat, which may be removed after cutting off the endocarp and studied

in surface view (*Fig. 36*). Most of the cells are of fantastic form with wavy outline, and often reach a length of 0·2 millimeter. The walls are beautifully reticulated, the nearly circular pores being 0·004 millimeter in diameter. This coat is highly characteristic. The raphe is not conspicuous.

The Endosperm (*Fig. 35*, E) *and Embryo* are much the same in structure and form as in the cranberry.

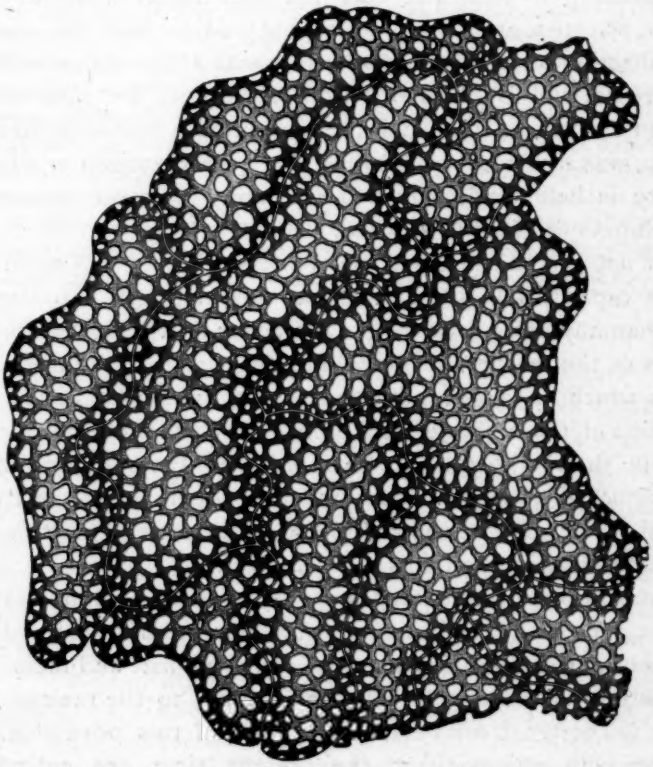

FIG. 36.—Huckleberry testa in surface view. × 300.

Microscopic Examination of Huckleberry Preserves.—The characteristic elements of the huckleberry which may be found in preserves are the large stone cells of the mesocarp and endocarp, and the reticulated cells of the testa. Stone cells of the mesocarp are distributed throughout the preserve, but those of the endocarp should be examined in transverse section. The testa is best seen in surface preparations.

EDITORIAL.

THE PROCTER MONUMENT.

The Pharmaceutical meeting held at the Philadelphia College of Pharmacy on Tuesday evening, December 13th, might be fittingly styled a Procter Memorial Meeting; the occasion furnishing a beautiful tribute to the memory of Professor William Procter, Jr. It must have been exceedingly gratifying to those of his family who were present, to hear not only the encomiums of his work as a teacher, scientist, author and editor, but also to hear the words of deep affection of those who had a personal acquaintance with him. The presence of Dr. Hancock from Baltimore, the birth-place of William Procter, in the hall of the institution where he achieved his renown, was significant as showing the general esteem in which his memory is held, and as further indicating that the movement to honor him is destined to succeed.

It is not too much to say that Professor Procter did more in his various capacities to place American pharmacy on a professional basis than any other man. As a professor he recognized the obligations of the teacher, not only imparting instruction in the special branch which he taught, but also training his students in the consideration of the higher ethical problems of the profession. As an editor he showed how keenly he appreciated the responsibilities in the conduct of a journal. As a member of the American Pharmaceutical Association he showed to the fullest extent what membership in an association of this kind involves.

American pharmacy to-day is greatly in need of high ideals and there is a necessity of keeping before our minds the worthy examples of our calling; the more we can symbolize and memorialize the qualities of those who raised this calling to the rank of a profession the better it will be for the future of this pro ession. The tendencies in pharmacy at the present time are entirely too utilitarian, and we can never hope to raise pharmacy to a higher plane until we have changed the mental attitude of pharmacists themselves. By putting aside the utilities for a season let us hope that we will be able to carry on a work to completion which will not only be an honor to one of the most distinguished men in American pharmacy, but will also have an educational value in showing to the world that there is a profession of pharmacy, and in showing to pharmacists that they have a profession to maintain.

The movement to honor the memory of Professor Procter in a tangible way may be said to have begun at the Put-in-Bay meeting of the American Pharmaceutical Association, when after the report of the Committee on Semi-Centennial Celebration, Albert E. Ebert said (See Proc. A.Ph.A., 1899, p. 114):—

If that committee is to be continued I would like to draw their attention to one feature. There is one man who belonged to this association—he was one of the founders of the association—who is seemingly forgotten. He is the father of pharmacy of this country, and that is William Procter. It seems to me, without saying anything against the other men who have lived and worked for the advancement of pharmacy and this association, that it is possible or this association at the time of our fiftieth anniversary to do something to commemorate his valuable work; it would be a grand thing for the association. There has been no man associated with this organization who has done so much, who has been such a faithful servant of this association in times gone by, who cared for it to that extent that William Procter did; and I hope in some way, when we meet in Philadelphia in 1902, that his memory, above all others, will be brought out in a way to hand it down to the twentieth century, because we are somewhat forgetting the grand work William Procter has done for American pharmacy.

At this same meeting Mr. Ebert told the editor of this JOURNAL that some years before he had spoken to the late Professor Trimble about this matter and he seemed to feel that we should take the initiative in an effort to revive the memory of Professor Procter, whereupon the editor of this JOURNAL, who was also secretary of the Committee on Pharmaceutical Meetings of the Philadelphia College of Pharmacy, invited Professor Remington to prepare a memorial sketch of Professor Procter for presentation at one of these meetings, but as the time was approaching for the annual meeting of the American Pharmaceutical Association it was thought better to present it there. This address was subsequently published in the Proceedings of the A. Ph. A. (1900, p. 22) and in this JOURNAL (June 1, 1900), where we also published a portrait of Professor Procter, as he was better known perhaps to those who still recollect him, and which was taken from the oil painting in the museum of the Philadelphia College of Pharmacy.

In the same year (October, 1900) we published letters containing some recollections and reminiscences of Prof. Procter from Frederick Hoffmann, James T. Shinn and George W. Sloan. In an editorial published in the November number were considered some of the forms of memorials which would be most suitable as a testimonial to Professor Procter. During the next year (February, March and

April) this matter was further discussed by various members of the Association in a series of letters. The following are the names of those who contributed to this discussion :—

Frederick Hoffmann,
W. L. Scoville,
J. U. Lloyd,
J. M. Good,
Albert B. Prescott,
S. W. Fairchild,
Horatio N. Fraser,
W. M. Searby,
S. A. D. Sheppard,
J. H. Beal.
George W. Sloan,
H. V. Arny,
J. F. Patton,
A. R. L. Dohme,
Frederick J. Wulling,
Joseph Helfman,
G. H. C. Klie,
A. B. Lyons,
Edward Kremers,
F. B. Power,
J. E. Morrison,
H. M. Whelpley,
E. L. Patch,
William C. Alpers,
R. G. Eccles,
F. G. Ryan,
L. E. Sayre,
H. P. Hynson,
H. M. Whitney.

It looked at one time as though there was a possibility of starting a movement favoring the establishment of a research laboratory in honor of Professor Procter and various members of the Association were invited to express their opinion of the matter (Am. Jour. Ph., May, June, July and August, 1901). Replies were received from the following :

A. B. Prescott,
J. N. Hurty,
Leo Eliel,
W. S. Thompson,
Edsel A. Ruddiman,
E. L. Patch,
H. V. Arny,
J. O. Schlotterbeck,
Frederick J. Wulling,
A. R. L. Dohme,
W. M. Searby,
L. E. Sayre,
Merck & Co.,
E. Fougera,
R. G. Eccles,
The Wm. S. Merrell Chemical Company,
Lehn & Fink,
Johnson & Johnson.
Frederick Stearns,
Horatio N. Fraser,
John F. Patton,
Charles Caspari, Jr.,
Joseph P. Remington,
C. Lewis Diehl,
John Uri Lloyd.

In his address before the American Pharmaceutical Association in 1901, President John F. Patton referred to the proposed Procter memorial, whereupon a resolution was adopted favoring the appointment of a Procter Memorial Committee, which committee was subsequently appointed by President Whelpley and made a report at the semi-centennial meeting in Philadelphia in 1902 (this

JOURNAL, 1902, p. 488). At this same meeting a memorial sketch was read by Albert E. Ebert at the special jubilee session (this JOURNAL, 1902, p. 461). The Committee of the A. Ph. A. made a report at the Mackinac meeting in 1903. At this same meeting John F. Hancock presented a paper advocating the establishment of a monument as a memorial to Professor Procter. A similar paper appeared in this JOURNAL in July, 1903. The matter was again brought to the attention of the Association last year by Mr. Hancock, and the Association has taken official action in the matter and appointed a Procter Monument Committee.

Meantime the question of a Procter Memorial has been considered by several of the State Pharmaceutical Associations and a number of them have evinced a cordial interest in the matter, and at the present time at least two of them, viz., the Maryland and New Jersey Associations, have committees for considering the matter and stand ready to co-operate with any national movement.

It is thus seen that the idea of a Procter monument has been in process of evolution for a number of years and with the form of memorial fixed it is sincerely hoped that all of those who have the best interests of American pharmacy at heart will join heartily in a work which will reflect everlasting credit upon the pharmaceutical profession in America.

TRIBUTES TO THE MEMORY OF PROFESSOR PROCTER.

At the Pharmaceutical meeting on Tuesday evening, December 13th, the following tributes were paid to the memory of Professor Procter:

PRESIDENT HOWARD B. FRENCH

in introducing Dr. Hancock, said:

Professor William Procter, Jr., one of the most esteemed members of the faculty of our College and one of the most influential characters in American pharmacy, was born on May 3, 1817, in the city of Baltimore. He came to Philadelphia in 1831 and entered the drug business as an apprentice, and was graduated from our College in 1837.

On September 21, 1846, the chair of pharmacy was established in this College, and Professor Procter was made the first incumbent, holding the chair until March 16, 1866, when he resigned.

Professor Procter was also editor of THE AMERICAN JOURNAL OF

PHARMACY from July, 1850, until April, 1871. He was one of the founders of the American Pharmaceutical Association. Indeed it would seem that his work in this Association was co-ordinate with his work in the Philadelphia College of Pharmacy. It is perhaps not too much to say that up until a few years ago the American Pharmaceutical Association was looked upon, in a measure at least, as being the child of the Philadelphia College of Pharmacy.

In 1899 Mr. Ebert, of Chicago, suggested that something be done to revive the memory of Professor Procter. The matter has been considered by the American Pharmaceutical Association, by some of the State Pharmaceutical Associations, and has been considered at length in the columns of THE AMERICAN JOURNAL OF PHARMACY.

The American Pharmaceutical Association has now appointed a committee to devise ways and means for erecting a monument to the memory of Professor Procter, and Dr. John F. Hancock, one of the best known manufacturing pharmacists of Baltimore, is chairman of this committee. Dr. Hancock was a personal friend of Professor Procter, and will address us this evening on "William Proctor, Jr., the Father of American Pharmacy."

PROFESSOR JOSEPH P. REMINGTON,

at the conclusion of Dr. Hancock's address (see page 13), said:

I am pleased to welcome Mr. Hancock and thank him for his eloquent tribute to the memory of William Procter, whose assistant I was, and whom I knew most intimately for eleven years, and for two years was in almost daily contact with him.

Mr. Hancock has dwelt upon his professional career; this was all and more than he described, but great as he was as a pharmacist, he was even greater as a man. It is well that he should be called "the Father of American Pharmacy." He labored at a time when this College was small and pharmacy in this country was in its infancy. He was the first professor of pharmacy in this College, and probably the first in America. In those days, before the chair of pharmacy was founded, chemistry and materia medica were the only branches taught at college, and pharmacy was taught in the store. Under Professor Procter's initiative the "rule of thumb" method of teaching was followed by systematic and graded instruction. The syllabus on pharmaceutical subjects, originally proposed

by Soubeiran and modified by Professor Procter, is the basis to-day of the best classification that we have.

It is meet and proper that Mr. Hancock should come to us from our sister city in this brotherly and kindly way and tell us of the movement which he has started to honor the memory of this great man. The Philadelphia College of Pharmacy will do its full duty. I might mention the fact as showing his powers of concentration that Professor Procter performed his literary duties coincidently with his practical store duties. Those matchless editorials and lucid papers whose meaning could be grasped alike by student and scholar, were often prepared at his little desk near the prescription counter, from whence at any moment he might be called upon to wait upon a customer. But there is his monument—in his daily life; the original work, the hundreds of papers to be found in the AMERICAN JOURNAL OF PHARMACY and the Proceedings of the American Pharmaceutical Association, covering every class of pharmaceutical subjects.

He was a genius, if by this is meant the capacity for great labor. I assure you, Mr. President, of my hearty co-operation in the work.

DR. ADOLPH W. MILLER

said: I left the distant city of St. Paul, Minn., in 1860 for the single purpose of attending the lectures in the Philadelphia College of Pharmacy. It so happened that the very first lecture that I listened to in the old College Building on Filbert Street was delivered by Prof. Wlliam Procter. As has been stated by the previous speakers, his delivery was not by any means fluent or brilliant, but he impressed me very forcibly with the profundity of his learning, with the marvelous amount of care and study that he must have given to the subject under his consideration at that time. I immediately recognized in him the foremost representative of the art and science of pharmacy, as he had previously been represented to me by my former preceptors, so that the first slight disappointment on account of the manner of his delivery was at once effaced.

In subsequent years I frequently had occasion to call on Professor Procter for advice and counsel in scientific matters pertaining to pharmacy, and I invariably was met by him in the most cordial and genial manner. The rich stores of knowledge which he possessed were always at the service of whosoever asked for them, and it

really seemed to give delight to Professor Procter to be of assistance to any one in pursuit of investigations in his domain of study.

I am indeed very glad that Dr. Hancock has taken in hand the erection of a bronze statue to our departed friend, and I most sincerely hope that his project will soon be realized. It occurs to me that no more fitting locality for the placing of this lasting monument could possibly be selected than the vicinity of the Smithsonian Institute in our National Capital, where Professor Procter will stand in close proximity to that other esteemed teacher of mine, the father of American Surgery, the late Prof. Samuel B. Gross, which statue was placed there by the physicians and surgeons of the United States. By placing Professor Procter's statue in his company, we will in a manner emphasize the equal claims with pharmacy and surgery in the esteem of future generations of visitors to the National Capital.

GEORGE M. BERINGER

said: "It was not my privilege to know Prof. William Procter, Jr., as he had passed away before my entrance into the drug business, but I am acquainted with his more than five hundred contributions to the pages of the AMERICAN JOURNAL OF PHARMACY. I fully appreciate the useful and practical nature of many of these contributions and the high ideal of pharmacy which were therein promulgated.

"It appears to me that at least three States have a peculiar interest in perpetuating the memory of Prof. William Procter, Jr.—Maryland, as his birthplace and the State wherein he spent the days of his childhood; Pennsylvania, where he achieved his success and performed his monumental labors in behalf of pharmacy; and New Jersey, wherein he spent a short portion of his declining days, and which State has furnished a final resting-place for his body.

"The New Jersey Pharmaceutical Association, recognizing the propriety of perpetuating his memory, several years ago appointed a committee on Procter Memorial. This committee has been continued, awaiting the crystallization of the various plans suggested into a national movement that might be considered definite and feasible.

"I have no doubt that the movement now inaugurated by the appointment of a committee of the American Pharmaceutical Asso-

ciation, looking toward the establishment of a monument on the grounds of the Smithsonian Institute, at Washington, will receive the co-operation and support of the New Jersey Association."

M. I. WILBERT

spoke as follows: "While I am heartily in favor of the proposed statue, I am not so sanguine of the feasibility of securing the necessary funds at the present time. But whether this is actually accomplished or not, I feel that pharmacists in general, and the members of the Philadelphia College of Pharmacy in particular, owe a debt of gratitude to Mr. Hancock for reviving the memory of William Procter, his ideals, precepts and teachings at a time when all the prevailing tendencies appear to be drifting along commercial lines.

"In this connection I would like to call particular attention to 'An Address to the Pharmacists of the United States,' written by William Procter fifty years ago and published in the volume of the 'Proceedings of the American Pharmaceutical Association' for that year (1854.) Other volumes of the proceedings of this same association, notably those for 1852, 1853 and 1858, also contain contributions along these same lines.

"I wish especially to call attention to what I consider the most important, and in many respects the most appealing, expression by William Procter on the question of professional pharmacy. This is contained in the valedictory address to the class of 1866, when William Procter resigned from the chair of the practice of pharmacy in this college. This valedictory was intended as a farewell not alone to the class of that year, but also to the members of the college and others on his retiring from active life as a teacher, and contains a number of thoughts that are particularly appropriate to present conditions. While Professor Procter did resume the chair of the practice of pharmacy on the death of Professor Parrish, he did not live to again address a graduating class at an annual commencement."

Mr. Wilbert then read the following extract from this address:

"The custody, preservation and preparation of the various medicinal agents demand intelligence and skill, and they in whom the trust is reposed should have received a careful educational training and be animated by higher motives than those which usually rule in trade and commerce.

"Pharmaceutical education, animated by correct moral principles, is the only lasting basis for the reform, yet so sadly needed in the practice of pharmacy. The great tendency of our times is to acquire wealth quickly without labor, or with labor but for a brief period. Any course that opposes this is distasteful. Under the influence of this, even in pharmacy, there is a growing disposition to avoid making costly and troublesome preparations by referring them to the chemist or manufacturing pharmaceutist. Many stores are annually becoming more and more mere dispensaries. The laboratory is fast disappearing as an indispensable appendage to the dispensary, while the mercantile department is proportionately developing and extending. In a word, the apothecary is becoming a merchant, and the value of a clerk is rated by some, less by his scientific skill than by his ability as a salesman.

"In Germany the pharmaceutist is responsible for the quality of the preparations he dispenses. He is bound either to make them himself or by testing them to be assured of their good quality. Let us hope that this rule may some day obtain here and sift out the pretenders who, to so large an extent, enjoy the confidence and patronage of the public. Let us remember that each one of us has a mission in this world, and, having adopted pharmacy, let us do our best with it, infusing the true and right into its rules and processes, and leave it better than we found it to those that succeed us."

JAMES T. SHINN,

having been called upon for some remarks, said: "I remember Professor Procter when he lectured in the college building on Zane Street over the casks of sugar stored in the cellar. Though not a brilliant speaker, he was clear and forceful in style. The quiz was held before each lecture, and I remember when I only knew four out of five answers to his questions. I did not say anything, though he would have kindly helped me out with the last one. Years after he and I canvassed the lower part of the city for contributions to the College Building Fund, and his manner was kind and genial as well as persuasive. He was active in the pharmaceutical meetings, often reading papers of practical interest.

"His memorial has already been erected in the work he has done for our College, the AMERICAN JOURNAL OF PHARMACY and hosts of young men who were privileged to study under him. A monument

of bronze as proposed by Mr. Hancock might perpetuate his memory to future generations, and though his retiring spirit would object to such a public display, and my Quaker training would lead me to disapprove of it, I fear I would be inconsistent enough to subscribe towards its erection."

EVAN T. ELLIS

spoke as follows: "I cannot recall the exact time of my first acquaintance with Professor Procter, being in doubt as to whether it was when he was an apprentice with the dear old-time apothecary, Henry M. Zollickoffer, in the '40's, or soon after he located in his own store at Ninth and Lombard Streets. I rather believe it was the latter (1844). As our own store, through my dear father, was the publication office of the JOURNAL, or rather the business office of the JOURNAL for nearly half a century, it was my fortune to see much of Professor Procter. With his great attainments in the pharmaceutical world, there was one thing that greatly impressed myself and all who were brought in relations with him—his great modesty and retiring nature. When in after years his name had been known and honored not only throughout our own country, but abroad, William Procter, Jr., was the same.

"'Not the applause of listening Senates to command'

could ever have made William Procter, Jr., different from what he was."

EDWIN M. BORING

spoke as follows: "To have Dr. Hancock, who is one of the most popular members of the American Pharmaceutical Association, come here to present the claims for recognition of Professor Procter's services to pharmacy, seems like carrying coal to New Castle, but we must admit that he has done this work well."

It was my privilege to sit under Professor Procter's lectures in the winters of '65 and '66; also to meet him at our pharmaceutical meetings up to the time of his death. His learning, moral worth, sincerity of purpose and great modesty commanded the admiration and respect of all who knew him.

JOHN F. HANCOCK

said: I desire to explain that my address was made as brief as possible that others might have time to discuss the subject.

I had read the views expressed in the journals, recommending various means of honoring the memory of the late Professor Procter.

I was present at the dedication of the bronze monument in commemoration of the American surgeon, the late Professor Samuel D. Gross, of your city, in the Smithsonian grounds at Washington, D. C., and it then occurred to me, that of all the views expressed in favor of memorializing the life work of the American pharmacist, the late Prof. William Procter, Jr., the "monument" would be the most appropriate.

This thought so impressed me at the time that I have become zealous and feel a willingness to work for its consummation.

The research laboratory idea that has been popular with some pharmacists, is to me inadequate.

In the beginning it might be highly creditable, but like some changeable creation of man it may become in the course of time inconsistent with so distinguished a character.

The proposed medals would be too ephemeral and quite insignificant. Being small and easily lost they would soon elude public notice, but the "monument" given over to the custody of the United States Government, in commemoration of him, would be looked after, cared for, and remain a chapter of our Nation's history while our civilization endures.

WILLIAM MCINTYRE

paid the following tribute to the memory of Professor Procter:

The former speakers have in elegant and forcible language told us what a very practical and scientific man William Procter was. Now as a student of his I can bear testimony to his intense interest in us. An incident or two will develop what I mean. At my final examination he exhibited a beautiful porcelain-like specimen of Arsenious Acid and inquired, what is it? I failed to recognize it. A bottle of alcohol was then shown and recognized. After several questions on the subject he said to me—"Be as careful in its use as you would of the Arsenious Acid."

Meeting him a few years later he said: Why you seem to be making the mistake of so many young apothecaries. Continuous attention to the store had impaired my health. He suggested I cultivate the habit of taking a vacation, and recommended the meetings of the American Pharmaceutical Association as being just the right thing. I have reason to be thankful for his good advice.

Feeling that I will express the sentiment of all the ladies and gentlemen present, I now offer a motion—that the thanks of the meeting be given to Dr. John F. Hancock for his address relative to a monument to William Procter.

HENRY A. BORELL

sent the following letter:

I met Prof. William Procter, Jr., a few times in my early apprenticeship; it was on matters of business. I was sent to him, I think, in reference to Pepsin. I was most favorably impressed with his quiet and easy manner, and often afterwards regretted that he no longer was of the teaching faculty of the Philadelphia College of Pharmacy.

THOMAS S. WIEGAND,

when asked to give some of his personal recollections of Professor Procter, said:

I regret my health does not permit me to be out after nightfall, or I should have been most glad to have attended the meeting held last evening and voiced my remembrances of my friend, Prof. William Procter, Jr. My acquaintance with him began about the year 1844 or 1845, and from that time up to the time of his decease our relations were of the most cordial character.

The most prominent trait, and one which made all his friends confide in him so fully, was his perfect frankness and sincerity—always expressing his full opinion and conviction upon any subject he discussed. This always made any one who consulted him on any subject feel sure of good, wholesome, sound advice. To estimate his position in pharmacy, one must consider the changes that have taken place in the business of pharmacy from his active participation in it and its present status.

When Professor Procter entered into business the apothecary was pre-eminently a practical man, a worker in the *art*, a real maker of the materials he supplied to his customers and used in the compounding of prescriptions and the preparations he dispensed; hence he became fitted by his work and his careful habit of observation to give that information which all who knew him so much appreciated, and this fitted him for that place which so many of his confrères have been pleased to bestow on him—the Father of American Pharmacy.

The pages of THE AMERICAN JOURNAL OF PHARMACY will show to those who did not have the great privilege of his personal acquaintance, that by a rough and hasty count of papers in the Index there are over 500 different papers furnished by him, and this it must be remembered was accomplished while the responsibilities of a large retail business were on his shoulders and the lectureship in the College also demanded his personal attention. Papers also contributed to the proceedings of the American Pharmaceutical Association must not be overlooked, and the syllabus of the course of study for pharmaceutical classes, which will ever be a lasting memorial of his clear-sighted view of pharmacy in its relation to the education of those who chose pharmacy for their calling. It has been a frequent source of regret that the writer did not enjoy the great advantages of the courses of lectures given by Professor Procter at the Philadelphia College of Pharmacy.

The present generation of pharmacists have, however, the advantages of being the *elèves* of those who were instructed by Professor Procter, and as these pupils of Professor Procter are and have been in many instances scattered over our country and teachers in many of the colleges of pharmacy it is easily to be seen how very greatly the influence of the Professor's teaching has extended throughout our land.

This short review of his influence, it seems to me, makes it most eminently proper that a fitting memorial to his worth and ability should be erected in some place where the national character of his influence on pharmacy would call the attention of all who visit our country and especially our capital for all time to come.

HENRY CRAMER,

of Germantown, wrote as follows: "I acknowledge receipt of yours of December 9, 1904. Advanced years and continued impaired health forbid my attendance at the Pharmaceutical meeting during evening of December 13th. Regretting inability to be present, I hereby earnestly support the intention to create a monument in memory of Professor Procter, the 'Father of American Pharmacy,' as he is deservingly styled in your call for the meeting.

"Not long after my arrival in Philadelphia—July, 1849—I became acquainted with him. He met me with his well-known kindliness —continual to his last days—I bear him grateful remembrance."

PHARMACEUTICAL MEETINGS.

(NOVEMBER AND DECEMBER.)

The stated Pharmaceutical Meeting of the Philadelphia College of Pharmacy was held on Tuesday afternoon, November 15th, with Howard B. French, President of the College, in the chair.

The first speaker introduced was M. I. Wilbert, Ph.M., who presented a communication on "Progress in Pharmacy," this being a quarterly review of the advances in pharmacy and materia medica. (See this Journal, December, 1904.)

In the discussion following the paper, Mr. Wilbert said that there were some twenty odd names for epinephrin—all trade-marked and each the property of the house applying it. He said that likewise there were almost as many proprietary names for hexamethylene tetramine as cystogen, formin, etc., and although this salt under the true chemical name is cheaper in price than the proprietary articles, these must be dispensed if prescribed. He therefore agreed with the proposition to refer this question to some scientific society, as the American Therapeutical Association, to see whether these products are identical in solubility, therapeutic action, etc., and to correlate the results and select one common name for them.

Dr. C. B. Lowe was of the opinion that manufacturers would object to such a proceeding, each one claiming superiority for his product.

George M. Beringer thought that in the case of pharmacopœial articles it might be safer to say that the proprietary articles are said to be the same as those in the Pharmacopœia.

The therapeutic properties of epinephrin having been alluded to by Dr. Lowe, Wallace Procter said that he was inclined to believe that when this substance came to be more definitely known it would be treated in much the same way as pepsin is at present. He said that pepsin is now recognized by the Pharmacopœia and that manufacturers vie with one another to come up to the official standard, and that while there are a good many commercial kinds an effort is made to make them correspond to the U.S.P. requirements.

President French next called attention to the historical scientific exhibit to be held shortly in London by Henry S. Wellcome, and stated that Mr. Wellcome desired the loan of historical objects

illustrating the development of the art and science of healing throughout the ages, and that he would have the articles insured while in his possession and en route, if desired, and also pay for their transportation both ways.

Dr. Lowe spoke of Mr. Wellcome's interest in scientific matters and referred to his explorations in South America to determine whether the Indians or the Spanish were the first to use Cinchona as a medicine.

George M. Beringer, A.M., presented a paper entitled, "A Record of Several Toxicological Investigations," and exhibited in connection therewith the specimens that had been prepared for the trials referred to in his paper. The paper will be published in a later issue of this Journal.

In prefacing his remarks, Mr. Beringer said, it must not be supposed that in toxicological examinations of the kind recorded the work can be entirely carried out according to the books, but that each case is a law unto itself.

In commenting upon the fact that no inflammation of the walls of the stomach was noted in the arsenic poisoning case referred to by Mr. Beringer, Dr. John Marshall said that when arsenic is administered in the form of arsenite no inflammation of the membrane of the stomach takes place, as the poison is so quickly absorbed; but, on the other hand, there is no case on record of administration of the oxide in which inflammation does not take place.

Dr. S. Solis Cohen, Professor of Clinical Medicine in Jefferson Medical College, gave an address on "The Proper Scope of Scientific (so-called Expert) Testimony in Trials involving Pharmacological Questions," an abstract of which follows (see also page 1):

Physicians and pharmacists called upon to testify in court should not permit themselves to be placed, even apparently, in the position of partisans. They should by the directness, simplicity, completeness and frankness of their answers to both sides, show their sincerity and truthfulness. The scientific or expert advocate has a legitimate place in court, but it is by the side of counsel, not in the witness box. The two functions should not be united.

The function of a scientific witness is to enlighten the judge and jury as to the significance of certain facts and relations beyond the ordinary knowledge, but of which he has made a special study. His testimony must be based in part upon his reading, in part upon his

observation. To exclude as hearsay that which is based upon reading—even when it can be discriminated—might exclude testimony as to the homicidal and suicidal tendencies of maniacs if one had never actually seen a maniacal killing, as well as testimony as to the possibility of death from strychnin, if one had never actually seen a person die from such cause, or as to the presence of arsenic in a normal thyroid gland if one had not made a personal analysis.

Expert witnesses concerning pharmacologic questions are called upon to give four different orders of testimony not usually discriminated. They are all treated as matters of opinion, but in reality three relate to matters of fact. (1) Personal observations on the part of the witness as to the effect of drugs on the human or animal body are judgments of fact. They may be mistaken judgments, as may also be the judgment of a surveyor as to the location or dimension of a certain plot of ground, but both judgments are of the same order; they both depend on the interpretation of data observed by special methods. They differ from ordinary judgments of fact and from each other, not in kind, but in degree of complexity. (2) The methods of chemical analysis and their results are obviously matters of fact. The conclusions based thereon are judgments of fact as in the case first cited. That arsenic has or has not been found in a given case is not a matter of opinion, but one of fact. It is to be criticised from that standpoint. If the methods pursued have been faulty, or if the results have been inconclusive, that can properly be shown, but also as matters of fact. (3) Matters of general scientific knowledge, *e. g.*, as to the action of drugs, or the contamination of foods, drugs and manufactured articles of various kinds by poisons, or as to chemical and pharmaceutic incompatibilities, and so forth, are also matters of fact, whether within or without the personal observation of the witness. Concerning matters, however, which are not only outside the observation of the witness, but beyond the usual range of his studies, he can only have an opinion. He cannot know them as facts, and he should refuse to testify concerning them. (4) When the witness has made no personal observation, and is called upon to form judgment upon data which consist of the descriptions and judgments of others bearing upon a particular case, he cannot know the facts, and he cannot give testimony; he can only express an opinion. The fact that the opinion is expressed in court and under oath does not alter its character. It is purely

subjective, and represents the state of mind of the witness and nothing else. As such it will have weight with judge and jury according to the estimate they make as to the fitness and capacity of the witness to form opinions upon facts of the order submitted. One great difficulty arises from the necessity to avoid technical terminology in matters that cannot be made entirely clear without it, but the slighting opinion often expressed or intimated as to the value or sincerity of medical and pharmaceutic expert testimony is but partly due to this or to the obscurity of the question concerning which they testify. It is in part to be attributed to the willingness of experts to combine the discordant functions of advocate and witness; in part to the fact that experts do not use sufficient care in framing their answers to avoid the appearance of giving a positive judgment when the facts are insufficient for positiveness; in part to the fact that experts permit themselves to answer questions that can have no object but to confuse the minds of the jury; questions that are not relevant, questions that are simply captious criticism of unimportant details of the testimony of others, or questions that twist absence of knowledge into knowledge of absence. The expert should distort nothing, magnify nothing, minimize nothing; assert as positive nothing doubtful, throw doubt upon nothing certain; introduce nothing irrelevant, suppress nothing material. He should say nothing that he would be unwilling to defend before a learned society; he should be as frank upon cross-examination as upon direct examination; his efforts should be bent to elucidate truth, and not to score points for or against either side. The court should restrict examinations to matters having actual bearing upon the cause at trial, but the testimony of the expert should be given only with reference to scientific accuracy, and not with reference to its effect upon the verdict.

Among those taking part in the discussion of the address were Dr. Lowe, President French, Mr. Wilbert, Dr. Marshall, and Mr. Beringer.

Referring to the effects of the metallic poisons, Mr. French said that in an experience of sixty odd years the firm with which he is connected, namely Samuel H. French & Co., paint manufacturers, had never had a case of lead poisoning, and this he attributed to the fact that the workers in dry lead are advised to use olive oil freely with their food. He said that his firm had recommended this precaution to lead manufacturers throughout the United States.

In considering the question of expert testimony, Mr. Wilbert said that he had found that one way of keeping out of court was to insist on telling the truth.

Dr. Marshall said that Dr. Cohen had made a very clear statement of affairs here, but fortunately it did not apply to countries abroad, as there the experts are selected by the state. He said that it was unfortunate that in this country people sometimes testify as experts who are not qualified to do so, and in this connection he related an instance of a man making a pathological examination who was not a toxicologist at all, and said that his testimony might be taken as equal to that of the most eminent toxicologist. On the other hand, he said that in this day it was impossible to know all the sciences, and in a toxicological examination a chemist might be sneered at because it was his first case, and yet be able to make a correct analysis.

Mr. Beringer said that attorneys often interfere with experts by not allowing them to explain their answers, insisting instead that they answer simply categorically yes and no.

Dr. Marshall referred to the danger of publishing as positive deductions the results of incomplete and unconfirmed investigation, and cited that several years ago a young student in one of the Universities had published a paper, in which he stated that it "was impossible to recover administered strychnine in the intestines, claiming that it was destroyed in the alimentary canal." This damaging and erroneous statement had been given wide circulation. The fault was that the student had not adopted a method that would isolate the alkaloid, and on subsequently repeating the work by another method suggested to him by Dr. Marshall he had successfully separated the strychnine and had been compelled to publish a correction of his first paper.

In this connection Mr. Beringer exhibited a specimen of alkaloid strychnine, recovered from a portion of the intestines in the Woodward case, recorded by Dr. Marshall in *American Medicine*, June 18, 1904.

On motion of William McIntyre a special vote of thanks was tendered Dr. Cohen, for his able and interesting address.

FLORENCE YAPLE, *Secretary pro tem.*

It having been the desire of some of the members to hold a few of the Pharmaceutical Meetings in the evening, the third of the

present series was held on Tuesday evening, December 13th. The president of the College, Howard B. French, presided.

The principal speaker of the evening was Dr. John F. Hancock, of Baltimore, who gave an address on "William Procter, Jr., the Father of American Pharmacy." (See page 13.) Dr. Hancock was president of the American Pharmaceutical Association, at the Richmond meeting in 1873, and is one of its most esteemed members. He was a personal friend of Professor Procter and has for some years past been actively identified with the movement to memorialize the life and work of Professor Procter. Largely through his efforts the Association, at its last meeting, in Kansas City, adopted a resolution favoring the erection of a monument in the Smithsonian grounds in Washington City in honor of Professor Procter. President James H. Beal, of the Association, has appointed the following committee to carry on the work, of which Dr. Hancock is chairman: Benjamin T. Fairchild, New York City; Frank C. Henry, Washington, D. C.; C. S. N. Hallberg, Chicago; Henry Kraemer, Philadelphia.

Dr. Hancock's address was enthusiastically indorsed by the members present, and among those who spoke (see page 35) were President French, Professor Remington, James T. Shinn, Dr. A. W. Miller, Evan T. Ellis, E. M. Boring, William McIntyre, M. I. Wilbert, and George M. Beringer. Letters regretting their inability to be present were received from the following: Benjamin T. Fairchild, Frank C. Henry, J. H. Redsecker, Joseph Crawford, Wm. J. Miller, Henry A. Borell, H. Cramer, and Mahlon N. Kline.

M. I. Wilbert, Ph.M., read an interesting paper on "Dr. Christopher Witt—An early American Botanist and a man of many and varied attainments," which was illustrated by a number of lantern slides. This paper will be published in a later issue of this JOURNAL.

At the next meeting, which will be held Tuesday evening, January 10th, the following papers will be presented:

"A brief consideration of a few facts determining the Relationship between the Science and Art of Pharmacy and the Science and Art of Medicine." By Dr. Henry Beates, Jr.

"The Pharmacist and the Physician." By M. I. Wilbert, Ph.M.

There will also be communications from Prof. William Osler, Baltimore; Prof. John H. Musser, Philadelphia; and others.

"The Size of the Dropper as applied to Alkaloids in Eye Drops." By Dr. P. N. K. Schwenk.

HENRY KRAEMER, *Secretary.*